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**FDA documents provided to NRDC in response to a Freedom of Information Act (FOIA) request**
Part C: Tables of values considered in FDA risk assessment
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During the development of the allowable levels for PAHs in seafood in the wake of the BP Oil Spill, FDA staff reviewed multiple values for their risk assessment calculations and found many of them to be legitimate approaches. This included: 5 and 10 year contamination duration, 70 and 80 kg bodyweights, differing life expectancy rates, varying values for cancer potency, and alternative numbers for seafood consumption rates. See tables below which were included in correspondence between FDA staff.

## The FDA Table uses EPA RfDs, EPA BaP equivalencies, and CDC stats on body weight and life expectancy (all referenced)

## This Table assumes 80 kg body weight; 78 yr life expectancy; 10 yr exposure duration

Table I
Levels of Concern

| Chemical ${ }^{1}$ | Levels of Concern (ppm) |  |  | Basis |
| :---: | :---: | :---: | :---: | :---: |
|  | $\begin{gathered} 10 \text { p/day } \\ \begin{array}{c} \text { Strimp and } \\ \text { Crabs) } \end{array} \end{gathered}$ | $\begin{gathered} 10 \mathrm{~g} / \mathrm{day} \\ \text { (Oysters) } \end{gathered}$ | $\begin{aligned} & 43 \text { g/day } \\ & \text { (Finfish) } \end{aligned}$ |  |
| Napbithalene | 160.0 | 160.0 | 37.2 | Non-cancer EPA ${ }^{\text {R f }} \mathrm{OH}^{2} ; 80 \mathrm{~kg}$ bw |
| Fluorene: | 320.0 | 320.0... | 74.4. | Non-cancer,EPA R $\mathrm{TO}^{2} ; 80 \mathrm{~kg}$ bw |
| Anthracte | - 2400.0 | 2400.0 | 558.1 | Non-cancer EPA R $\mathrm{R}^{2} ; 80 \mathrm{~kg}$ bw |
| Pyrene | 240.0 | $240.0{ }^{\circ}$ | 55.8 | 'Non-caniceil EPA RfD'; 80kg bow |
| Fluoranthene | 320.0 | 320.0 | 74.4 | Non-cancer EPA RfD'; 80ikg bw |
| Crrysene | 85.8 | 85.8 | 20.0 | Canoer $0.001 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Benzo(k)fluoranthene | 8.6 | 8.6 | 2.0 | Cancer $0.01 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Benz(a)nantracene | 0.86 | 0.86 | 0.20 | Cancer $0.10 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{\text {a }}$ |
| Indo( $1,2,3$-cd) )yrene | 0.86 | 0.86 | 0.20 | Cancer $0.10 \mathrm{~B}(\mathrm{z}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Benzo(a)pyrere | 0.086 | 0.086 | 0.020 | $\begin{gathered} 10^{-3} \text { Cancer risk } \\ (110 \mathrm{mp} / \mathrm{p} / \mathrm{d})(78 / 10 \mathrm{yr})^{3} \end{gathered}$ |

Includes alkylated homologues and assumes they have similar toxicities to the parent compound
2 With respect to the Basis:

| Chemical | RfD $\times$ Body Wt. / Intake |
| :--- | :---: |
| Naphthalene: | $(0.02 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluorene: | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Anthracene: | $(0.30 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Pyrene | $(0.03 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluoranthene | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |

${ }^{3}$ Cancer risk-( $\mathrm{q}^{*}$ )-based criteria:

| Chrysene | [110ng $\times$ (78/10)]/[Daily Intake (g) $\times 0.001$ ] |
| :---: | :---: |
| Benzo(k)fluoranthene | [110ng $\times(78 / 10)$ V/Daily Intake ( g$) \times 0.01]$ |
| Beaz(a)anthracene | [110ng $x(78 / 10)] /$ Daily Intake (g) $\times 0.1]$ |
| Indo(1,2,3-cd) pyrene | [110ng x (78/10)) [Daily Intake (g) x 0.1 ] |
| Benzo(a)pyrene | [110ng x (78/10)//Daily Intake (g)] |

One-in-a-one hundred thousand increase in the lifetime ( $78 \mathrm{yr} \mathrm{)} \mathrm{upper} \mathrm{bound} \mathrm{cancer} \mathrm{risk} \mathrm{adjusted} \mathrm{to} \mathrm{account}$ for exposures which are expected to last longer than 10 years ( $78 / 10 \mathrm{yr}$ ). For any sample containing, chrysene, Benzo(k)fluoranthene, Benz(a)anthracene, Indo(1,2,3-cd)pyrene, or benzo(a)pyrene, the sum of the indlividual ratios of the detected levels to the levels of concern cannot exceed 1 .

## References

REF FOR AVERAGE WEIGHT OF AMERICAN 81.7 KG
McDowell MA, Fryar CD, Ogden CL, Flegal KM. Anthropometric reference dzta for children and adults: United States, 2003-2006. National bealith statistics reports; to 10 . Hyattsville, MD: National Center for Health Statistics. 2008.

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# DRAFT FDA Table uses EPA RTDs, EPA BaP equivalencies, and CDC stats on body weight and life expectancy (referenced). This Table assumes 80 kg body weight; 78 yr life expectancy; and 5 yr exposure duration 

Table I
Levels of Concern

| Chemical ${ }^{\text {' }}$ | Levels of Concern (ppm) |  |  | Basis |
| :---: | :---: | :---: | :---: | :---: |
|  | $\begin{gathered} 10 \mathrm{~g} / \mathrm{day} \\ \text { (Shrimp and } \\ \text { Crabs) } \end{gathered}$ | $10 \mathrm{~g} / \mathrm{day}$ <br> (Oysters) | $43 \mathrm{~g} / \mathrm{day}$ (Finfish) |  |
| Naphthalene | 160.0 | 160.0 | 37.2 | Noo-cancer EPA R(1) ${ }^{2} ; 80 \mathrm{~kg} \mathrm{bw}$ |
| Flooreac | 320.0 | 320.0 | 74.4 | Non-cancer EPA R R ${ }^{2} ; 80 \mathrm{~kg}$ bw |
| Anthruene | 2400.0 | 2400.0 | 558.1 | Noo-cancer EPA R(10 ${ }^{2} ; 80 \mathrm{~kg} \mathrm{bw}$ |
| Pyrene | 240.0 | 240.0 | 55.8 | Noa-cancer EPA R CD $^{2} ; 80 \mathrm{~kg} \mathrm{bw}$ |
| Fluoranticec | 320.0 | 320.0 | 74.4 | Noo-cancer EPA R(fD ${ }^{2} ; 80 \mathrm{~kg} \mathrm{bw}$ |
| Crarysene | 171.0 | 171.0 | 40.0 | Cancer $0.001 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivient |
| Benzo(k)fluoranthene | 17.1 | 17.1 | 4.0 | Cancer $0.01 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{\text {a }}$ |
| Benzo(b)neormathene | 1.7 | 1.7 | 0.40 | Cancer 0.10 B(a)P Pquivalent ${ }^{3}$ |
| Benz(a)anthracene | 1.7 | 1.7 | 0.40 | Cancer $0.10 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent' |
| Indeno ( $1,2,3$-dd)pyrene | 1.7 | 1.7 | 0.40 | Cancer $0.10 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalees' |
| Diberus $(2, \mathrm{~h})$ mitracene | 0.17 | 0.17 | 0.040 | Cancer $1.0 \mathrm{~B}(2) \mathrm{P}$ equivalent ${ }^{3}$ |
| Benzo(a)pyrene | 0.17 | 0.17 | 0.040 | $10^{3}$ Cancer risk $=$ ( $110 \mathrm{ne} / \mathrm{p} / \mathrm{d}$ ) $78 / 10 \mathrm{yy})^{3}$ |

${ }^{T}$ Includes alkylated homologues assumed to have similar toxicities to the parent compound.
${ }^{2}$ With respect to the Basis:

| Chemical | R(D $\times$ Body Wt. / Intake |
| :--- | :--- |
| Naphthalene: | $(0.02 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluorene: | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Anthracene: | $(0.30 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Pyrene | $(0.03 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluoranthene | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |

${ }^{3}$ Cancer risk-based criteria:

| Chrysene | $[110 \mathrm{ng} \times(78 / 5)] /$ Daily Intake $(\mathrm{g}) \times 0.001]$ |
| :--- | :--- |
| Benzo(k)fluoranthene | $[110 \mathrm{ng} \times(78 / 5) /$ Daily Intake $(\mathrm{g}) \times 0.01]$ |
| Benzo(b) fluoranthene | $[110 \mathrm{ng} \times(78 / 5)] /$ Daily Intake $(\mathrm{g}) \times 0.1]$ |
| Benz(a)anthracene | $[110 \mathrm{ng} \times(78 / 5)] /$ Daily Intake $(\mathrm{g}) \times 0.1]$ |
| Indo(1,2,3-cd)pyrene | $[110 \mathrm{ng} \times(78 / 5)] /$ Daily Intake $(\mathrm{g}) \times 0.1]$ |
| Dibenz(a,h)anthracene | $[110 \mathrm{ng} \times(78 / 5)] /$ Daily Intake $(\mathrm{g})]$ |
| Benzo(a) pyrene | $[110 \mathrm{ng} \times(78 / 5)] /$ Daily Intake $(\mathrm{g})]$ |

'Criteria are based on a one-in-a-one hundred thousand increase in the lifetime ( 78 yr ) upper bound cancer risk, adjusted to account for exposures which are expected to last longer than 5 years ( $78 / 5$ yr). For any sample containing, chrysene, Benzo(k)fluoranthene, Benzo(b)fluoranthene, Benz(a)anthracene, Indo(1,2,3cd)pyrene, Dibenz(a,h)anthracene or benzo(a)pyrene, the sum of the individual ratios of the detected levels to the levels of concem cannot exceed 1.

## THIS TABLE OF STATE VALUES IS SHOWN IN FDA FORMAT FOR COMPARISON PURPOSES ONLY

## State Calculations assume 70 kg body weight; 70 yr life expectancy; 10 yr exposure duration

Table I
Levels of Concern

| Chemical ${ }^{1}$ | Levels of Concern (ppm) |  |  | Basis |
| :---: | :---: | :---: | :---: | :---: |
|  | $\begin{gathered} 8 \text { g/day } \\ \text { (Shrimp amd } \\ \text { Crabs) } \\ \hline \end{gathered}$ | $\begin{aligned} & 14 \text { g/day } \\ & \text { (Oysters) } \end{aligned}$ | $32 \mathrm{~g} / \mathrm{d} x \mathrm{y}$ (Finfish) |  |
| Naptithalene | 175.0 | 100.0 | 43.7 | Non-cancer EPA R(19 ${ }^{2} ; 70 \mathrm{~kg} \mathrm{bw}$ |
| Fluorene | 350.0 | 200.0 | 87.5 | Non-canoer EPA Rid ${ }^{2} ; 70 \mathrm{~kg}$ bw |
| Anthracene | 2625.0 | 1500.0 | 656.2 | Non-cancer EPA R $\mathrm{RD}^{2} ; 70 \mathrm{~kg} \mathrm{bw}$ |
| Pyrene | 262.5 | 150.0 | 65.6 | Non-cancer EPA R ${ }^{\text {R }}$; 70 kg bw |
| Fluoranthene | 350.0 | 200.0 | 87.5 | Non-cancer EPA Rid ${ }^{2} ; 70 \mathrm{~kg}$ bw |
| Crysene | 83.9 | 47.9 | 20.9 | Cancer $0.001 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivilent ${ }^{3}$ |
| Benzo(k)fluoranthene | 8.4 | 4.8 | 2.1 | Cancer $0.01 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivaleat ${ }^{3}$ |
| Benzo(b)fluoranthene | 0.84 | 0.48 | 0.21 | Cancer 0.10 B(a)P Pquivalent ${ }^{3}$ |
| Benx(a)mathracene | 0.84 | 0.48 | 0.21 | Cancer 0.10 B (a)P Pequivient ${ }^{\text {a }}$ |
| Indo( $1,2,3$-cd)pyrene | 0.84 | 0.48 | 0.21 | Cancer 0.10 B (a)P P equivaloat ${ }^{3}$ |
| Dibenz( $(\mathrm{h})$ mathracease | 0.084 | 0.048 | 0.021 | Canoer 1.0 B (a)P P equivalent ${ }^{3}$ |
| Benzo(a)pyrene | 0.084 | 0.048 | 0.021 |  |

${ }^{1}$ Includes alkylated homologues, specifically $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3, \mathrm{C}-4$ napthalenes; $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3$ fluorenes; $\mathrm{C}-1$, $\mathrm{C}-2, \mathrm{C}-3$ anthracenes; $\mathrm{C}-1, \mathrm{C}-2$ pyrenes. Alkylated homologues assumed to have similar toxicities to the parent compound.
${ }^{2}$ With respect to the Basis:

| Chemical | R(D $\times$ Body Wt. / Intake |
| :--- | :---: |
| Naphthalene: | $(0.02 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluorene: | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Anthracene: | $(0.30 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Pyrene | $(0.03 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluoranthene | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |

${ }^{3}$ Cancer risk-( $q^{*}$ )-based criteria:

| Chrysene | [95.9ng x (70/10)]/Daily Intake (g) x 0.001$]$ |
| :---: | :---: |
| Benzo(k)fluoranthene | [95.9ng $\times(70 / 10)$ \[Daily Intake (g) $\times 0.01]$ |
| Benzo(b)fluoranthene | [95.9ng x (70/10))/Daily Intake (g) x 0.1 ] |
| Benz(a)anthracene | [95.9ng $\times(70 / 10) / /$ Daily Intake (g) $\times 0.1]$ |
| Indo( $1,2,3$-cd) pyrene | [95.9ng x (70/10)YDaily Intake (g) x 0.1] |
| Dibenz(3, h$)$ anthracene | [95.9ng x (70/10)//Daily Intake (g)] |
| Benzo(a)pyrene | [95.9ng x (70/10)]/Daily Intake (g)] |

The Stases lisited additionsi PAlls for completeness, and indicated that all available TEFs are included but may not be ured depending on chemical anglysis used.

One-in-a-one hundred thousand increase in the lifetime (assumes 70 yr life expectancy) upper bound cancer risk adjusted to account for exposures which are expected to last longer than 10 years ( $70 / 10 \mathrm{yr}$ ). The States did not address the Federal provision that the sum of the individual ratios of the PAH detected levels to the levels of concern should not exceed 1 .

### 7.3 CSF; 80 kg body wt.; NHANES consumption rates

Table I

## Levels of Concern

| Chemical ${ }^{1}$ |  |  | of Concern |  | Basis ${ }^{\text {a }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 90 g/day (Slarimp and Crabs) | 120 g/day (Oysters) | 160 g/day (Finfish) |  |
| Naptithaiene |  | 17.78 | 13.33 | 10.00 | $\begin{gathered} \text { Noo-cancer EPA RfD; } 80 \mathrm{~kg} \\ \text { bw } \end{gathered}$ |
| Fluorene |  | 35.55 | 26.67 | 20.00 | Non-cancer EPA RfD; 80 kg bw |
| Anthracene/phenanthrucene |  | 266.67 | 200.00 | 150.00 | $\begin{gathered} \text { Non-cancer EPA } \mathrm{RfD} ; 80 \mathrm{~kg} \\ \text { bw } \end{gathered}$ |
| Fluoranthene |  | 19.55 | 14.67 | 11.00 | Cancer $0.001 \mathrm{~B}(\mathrm{~s}) \mathrm{P}$ equivalency |
| Pyrase |  | 19.55 | 14.67 | 11.00 | Cancer $0.001 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalency |
| Benaja)anthracene |  | 0.19 | 0.15 | 0.11 | Cancer 0.10 $\mathrm{B}(\mathrm{z}) \mathrm{P}$ equivalency |
| Chrysene |  | 1.95 | 1.47 | 1.10 | $\begin{gathered} \text { Cancer } 0.01 \mathrm{~B}(\mathrm{a}) \mathrm{P} \\ \text { equivalency } \\ 10^{-5} \text { Cancer risk } \\ (110 \mathrm{ng} / \mathrm{p} / \mathrm{d})(80 / 5 \mathrm{yy})^{3} \end{gathered}$ |
| Benzo(a)pyrenc |  | 0.020 | 0.015 | 0.011 |  |
| TInciades alkyited toonologues, specifically $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3, \mathrm{C}-4$ naphaletes; $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3$ fluoretes, $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3$ anthracenesphenambrscenes; $\mathrm{C}-1, \mathrm{C}-2$ pyrenes. |  |  |  |  |  |
| ${ }^{2}$ With respers to the Rasis: |  |  |  |  |  |
| RID based criltrias: |  | R(1) |  |  |  |
| Naphthalcas: | 0.02 mpk | 8 $\times 80 \mathrm{~kg} /$ Duily 1 |  |  |  |
| Fimorene: | (0.04 mgk | x $500 \mathrm{~kg} / \mathrm{Daly}$ l |  |  |  |
| Athractne: | (0.30 mpk | X $\times 80 \mathrm{~kg} /$ Daily 1 |  |  |  |

Alkyated homologos assumed to have similar toxicities to the parens ecmpound. Anthrazene ned pherantracene were combinod because routiose chemical analysis does not distinguith between the analogues of these two compounds.
${ }^{3}$ Cancer risk-(q4)-buved criteria:
Flueranthent: [110ng $x$ (8015)yDily Intake ( E ) x 0.001$]$
Pyrent: [110ng x (5055)yDazy Tntake (e) x 0.001 ]
Beng(g)awbracenc: $[110 \mathrm{ne} \times(50 / 5) y$ Daily Irlake ( E$) \times 0.10]$
Chrysenc:
[110ng x (50/5) , Daily lrake (g) x 0.01]
Benxo(a)pyrine:
(110ng $x$ (8015) MDaily lytake (i))
One-in-athundred thousand increase in the lifetime upper bound cancer risk adjusted to aosount for exposures that are expested to last lotecr that 5 yess ( 805 yr). For any sample ocntainigg flucrathere, pyrene, bena(a)andhracene, chrysene, or berap(a)pyrene, the sum of the individat ratios of the detected levels to the levels of cencem canpot exceed !.

Calculations for RaPE canctr rick:
Dose for $10^{5}$ liftime upper-bound risk: $\quad 10^{5} / 7.3 /(\mathrm{mg} / \mathrm{kg} / \mathrm{d})=1.37 \mathrm{ng} / \mathrm{kg} / \mathrm{d}$.
Dose for a 80 kg person
Dase for a 80 kg person
corresponding to a $10^{4}$ lifetime apper-bourd risk: $\quad 137 \mathrm{ng} / \mathrm{kg} / \mathrm{d} \mathrm{x} 80 \mathrm{~kg}-110 \mathrm{ng} / \mathrm{d}$
$\mathrm{B}(\mathrm{a}) \mathrm{P}$ canter cquivalency factors:
EPA Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisorics. Vol. 2: Risk Assessment and Fish Consumption Limits, Third Edition. Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA 823-B-00-008, November 2000.

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## Table I

## Levels of Concern

| Chemical ${ }^{1}$ | Levels of Concern (ppm) |  |  | Baxis ${ }^{2}$ |
| :---: | :---: | :---: | :---: | :---: |
|  | $\begin{gathered} 90 \text { g/dxy } \\ \begin{array}{c} \text { (Shrimp and } \\ \text { Crabs) } \end{array} \\ \hline \end{gathered}$ | $\begin{aligned} & \text { I20 g/day } \\ & \text { (Oysters) } \end{aligned}$ | $\begin{aligned} & 160 \text { g/day } \\ & \text { (Finfish) } \end{aligned}$ |  |
| Naptitalene | 15.55 | 11.66 | 8.75 | Noa-cancer EPA RAD; 70 kg <br> bw |
| Fluorene | 31.11 | 23.33 | 17.50 | Non-cancer EPA RAD; 70 kg bw |
| Anthracene/pheranthracene | 233.33 | 175.00 | 131.25 | Noa-cancer EPA RfD; 70 kg bw |
| Fluoranthene | 0.76 | 0.57 | 0.43 | $\begin{gathered} \text { Cancer } 0.02 \mathrm{~B}(\mathrm{a}) \mathrm{P} \\ \text { equivalency } \end{gathered}$ |
| Pyrene | 0.12 | 0.09 | 0.06 | Cancer $0.13 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalency |
| Benz(a)anilhracene | 1.05 | 0.81 | 0.62 | Cracer $0.014 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalency |
| Chrysene | 1.14 | 0.86 | 0.65 | $\begin{gathered} \text { Conoer } 0.013 \mathrm{~B}(\mathrm{a}) \mathrm{P} \\ \text { equivelency } \end{gathered}$ |
| Benwo(a)pyrene | 0.01 | 0.01 | 0.008 |  |

Tnchales alkylated homologues, specifically $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3, \mathrm{C}-4$ napthalenes, $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3$ fuerents, $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3$
unthrscentelpheranhristutes; C-1, C-2 pyoents.

AKylated hoenolognes assumed to have similar toxicities to the parent compound. Anthracene and pheranthravene were eombined because roctire chemical analysis does not distinguish between the anzlogues of these two compounde.

|  | ix $\mathbf{q}^{+}$ |
| :---: | :---: |
| Flueranthene: | [ $980 \mathrm{ng} \mathrm{x} \mathrm{(70/5)]/Daily} \mathrm{lntake} \mathrm{( } \mathrm{~g}$ ) $\times 0.02$ ] |
| Pyrene: | [ $98 \mathrm{ng} \times$ ( $70 / 5$ )]/Daily Intake ( g$) \times 0.13$ ] |
| Benx(i)anthrucene: | [98ng x (70/5) /Darily ltake (8) $\times 0.014]$ |
| Chrystne: | [ $980 \mathrm{gg} \mathrm{x}(70 / 5)$ /Daig letake ( $)^{\text {x }} \times 0.013$ ] |
| Benso(f)pyrate; | [980g $\times$ ( $70 / 5$ )]/Daily letake (g)] |

One-in-abundred thoustad incresse it the lifetime upper bound canter risk adjusted to actount for exposerts which art expected to last longer than 5 years ( $70 / 5 \mathrm{yr}$ ). For any sampie containing fluoranthtne, pyacat, benz(i) mathracene, chrysene, or beroo(a)pyrene, the sum of the individual natios of the detected ievels easaot exoed 1 .
*Note: table corrected for Naphthalene RfD, BaP slope factor, and upper bound risk. The values listed above for fluoranthene, pyrene, benz(a)anthracene, chrysene, and benzo(a)pyrene were calculated using the dose corresponding to a $10^{-5}$ lifetime upperbound risk for a 70 kg person. In the Cancer risk- ( $q^{*}$ )-based criteria the dose corresponding to a $10^{-5}$ lifetime upper-bound risk for a 70 kg person is 98 ng . REMOVE THIS NOTE IF THIS TABLE IS USED.

Table I

## Levels of Concern

| Chemical ${ }^{1}$ | Levels of Concern (ppm) |  |  | Easis ${ }^{2}$ |
| :---: | :---: | :---: | :---: | :---: |
|  | 90 g/day <br> (Shrimp and <br> Crabs) <br> 17.8 | $\begin{aligned} & 120 \text { g/dsy } \\ & \text { (Oysters) } \end{aligned}$ | $\begin{aligned} & 160 \text { g/day } \\ & \text { (Finfish) } \end{aligned}$ |  |
| Naphthaiene | 17.78 | 13.33 | 10.00 | $\begin{gathered} \text { Non-cancer EPA RAD; } 80 \mathrm{~kg} \\ \text { bw } \end{gathered}$ |
| Flogrene | 35.55 | 26.67 | 20.00 | Non-cancer EPA RfD; 80 kg bw |
| Anthraceno'phenanthracene | 266.67 | 200.00 | 150.00 | $\underset{\text { bw }}{\text { Non-cancer }} \mathrm{EPA} ; 80 \mathrm{~kg}$ |
| Fluaranthene | 3.10 | 2.33 | 1.75 | Cancer $0.02 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalency |
| Pyrene | 0.48 | 0.36 | 0.27 | Cancer $0.13 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalency |
| Bend(a)smitiracene | 4.30 | 3.29 | 2.54 | Cancer $0.014 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalency |
| Chrysene | 4.65 | 3.49 | 2.66 | Cancer $0.013 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalency |
| Benzo(a)pyrere | 0.06 | 0.05 | 0.03 | $\begin{aligned} & 10^{-4} \text { Cancer risk - } \\ & (399 n \text { gip/d) } 70.5 y)^{5} \end{aligned}$ |

 unthracenes/phenanthrosenes; C-1, C-2 pyrenes.

| RfD tased crituris: | Rid |
| :---: | :---: |
| Naphithene: | (0.02 mp/agid $\times$ EKgy Daily Intake (kg) |
| Fluorne: | (0.04 mp/agld x 80 kg )/ Daily Intake (kg) |
| Analacenc | (0.30 mg/kg $4 \mathrm{~A} \times 80 \mathrm{~kg} / \mathrm{Daily}$ Intake (kP) |

Alkylated homologues assuned to have similar toxicities to the parent conpound. Amthrasene end phennethapene were combined bocacse routine chemical analysis does not distingaisi betwten the asalogues of thest two eompounds.

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Cancrer risk-{q*)-based criteriz
q**
Fluocanthece [399ngx (70.5) Datly lotake (&) x 0.0.2]
Pyrere:
```



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Chrysene:
[399ng x (70/5)\D.Dily Inake (8) x 0.014]
    [359ng x (7.5)\\Duily Intake (g)]
```

Onc-in-a-huidred thousand incresse in the lifetime upper bound ranser risk acjustod to aocount for exposures which are expestod to last longer than 5 years ( 7015 yr ). For any smple ocontaining fliboranthene, pyizne, betne (a)arthrecene, chrysene, or beaso(3)pyrene, the sum of the individeal raties of the detected levels cannot exoced 1 .
${ }^{*}$ Note: table corrected for Naphthalene RfD and upper bound risk. The values listed above for fluoranthene, pyrenc, benz(a)anthracene, chrysene, and benzo(a)pyrene were calculated using the dose corresponding to a $10^{-5}$ lifetime upper-bound risk for a 70 kg person. In the Cancer risk- ( $\mathrm{q}^{*}$ )-based criteria the dose corresponding to a $10^{-5}$ lifetime upper-bound risk for a 70 kg person is 399 ng , not 34 ng . REMOVE THIS NOTE IF THIS TABLE IS USED.

# **FDA documents provided to NRDC in response to a Freedom of Information Act (FOIA) request** <br> Part C: Tables of values considered in FDA risk assessment 

The FDA Table uses EPA RfDs, EPA BaP equivalencies, and CDC stats on body weight and life expectancy (all referenced)

## This Table assumes 80 kg body weight; 78 yr life expectancy; 10 yr exposure duration

Table I
Levels of Coneern

| Chemical ${ }^{1}$ | Levets of Concern (ppm) |  |  | Basis |
| :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{aligned} & 10 \mathrm{~g} / \text { day } \\ & \text { (Oysters) } \end{aligned}$ | 43 g/day (Finfish) |  |
| Naphthalene | 160.0 | 160,0 | 37.2 | Non-cancer EPA, RfD ${ }^{2}$, 80.0kg bw |
| Fluorene . .2. 8 in | 320,0 | 320.0 | 74.4 | Non-canoer EPA R ${ }^{\text {d }}{ }^{2} ; 80 \mathrm{~kg}$ bw |
| Athracene | 2400.0 | -2400:0 | 558.1 | Non-dincer EPARAD'; 80 kg bw |
| Pyrene | 240.0 | 240.0 | 55.8 | Noo-cancer EPA RAD ${ }^{2}$ : 80 kg bw |
| Flooranthene | 320.0 | 320.0 | 74.4 | Non-cancer EPA R $\mathrm{RID}^{2}, 80 \mathrm{~kg}$ bw |
| Chrysene | 85.8 | 85.8 | 20.0 | Canoer $0.001 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Benzo(k)fluoranthene | 8.6 | 8.6 | 2.0 | Cancer $0.01 \mathrm{~B}(\mathrm{a})$ P equivalent ${ }^{3}$ |
| Benzo(b)fluoranthene | 0.86 | 0.86 | 0.20 | Cancer $0.10 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Benz(z)anthracene | 0.86 | 0.86 | 0.20 | Cancer $0.10 \mathrm{~B}(\mathrm{a})$ P equivalemL ${ }^{\text {a }}$ |
| Indo( $1,2,3$-cd)pyrene | 0.86 | 0.86 | 0.20 | Carser 0.10 B (a)P equivweal ${ }^{\text {a }}$ |
| Dibend(ah)anthracene | 0.086 | 0.086 | 0.020 | Cancer 1.0 B (a)P Pquivzem? |
| Berzo(a)pyrene | 0.086 | 0.086 | 0.020 | $\begin{gathered} 10^{3} \mathrm{Cancor} \text { risk }= \\ (110 \mathrm{ng} \mathrm{p} p \mathrm{~d})(7810 \mathrm{y})^{3} \end{gathered}$ |

Includes alkylated homologues, specifically $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3, \mathrm{C}-4$ napthalenes; $\mathrm{C}-1, \mathrm{C}-2, \mathrm{C}-3$ fluorenes; $\mathrm{C}-1$, C-2, C-3 anthracenes; C-1, C-2 pyrenes. Alkylated homologoes assumed to have similar toxicities to the parent compound.
${ }^{2}$ With respect to the Basis:

| Chemical | R/D $\times$ Body Wt. Intake |
| :--- | :---: |
| Naphthalene: | $(0.02 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluorene: | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Anthracene: | $(0.30 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Pyrene | $(0.03 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluoranthene | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 80 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |

${ }^{3}$ Cancer risk-(q*)-based criteria;

| Chrysene | [110ng x (78/10)]/[Daily Intake (g) $\times 0.001]$ |
| :---: | :---: |
| Benzo(k)fluoranthene | [110ng $\times$ (78/10)]/Daily Intake (g) $\times 0.01$ ] |
| Benzo(b)fluoranthene | $[110 \mathrm{ng} \times(78 / 10)$ ) [Daily Intake (g) $\times 0.1]$ |
| Benz(a)anthracene | [110ng $\times$ (78/10))/[Daily Intake (g) $\times 0.1]$ |
| Indo(1,2,3-cd) pyrene | [110ng $\times$ (78/10)]/[Daily Intake (g) $\times 0.1$ ] |
| Dibenz(a,h)anthracene | [110ng $x(78 / 10)$ /Daily Intake (g)] |
| Benzo(a)pyrene | [110ng x (78/10)]/Daily Intake (g)] |

One-in-a-one hundred thousand increase in the lifetime ( 78 yr ) upper bound cancer risk adjusted to account for exposures which are expected to last longer than 10 years ( $78 / 10 \mathrm{yr}$ ). For any sample containing, chrysene, Benzo(k)fluoranthene, Benzo(b)fluoranthene, Benz(a)anthracene, Indo(1,2,3-cd)pyrene, Dibenz(a,h)anthracene or benzo(a)pyrene, the sum of the individual ratios of the detected levels to the levels of concern cannot exceed t .

# **FDA documents provided to NRDC in response to a Freedom of Information Act (FOIA) request** <br> Part C: Tables of values considered in FDA risk assessment 

## THIS TABLE OF STATE VALUES IS SHOWN IN FDA FORMAT FOR COMPARISON PURPOSES ONLY.

State Calculations assume 70 kg body weight; 70 yr life expectancy; 10 yr exposure duration

Table I
Levels of Concern

| Chemieal ${ }^{1}$ | Levels of Concern (ppm) |  |  | Basis |
| :---: | :---: | :---: | :---: | :---: |
|  | $8 \mathrm{~g} / \mathrm{day}$ (Shrimp and Crabs) | 14 g/day <br> (Oysters) | 32 g/day <br> (Finfish) |  |
| Naphthalene | 175.0 | 100.0 | 43.7 | Non-cancer EPA R Ris ${ }^{2}$; 70 kg bw |
| Fluorene | 350.0 | 200.0 | 87.5 | Non-cancer EPA RED ${ }^{2} ; 70 \mathrm{~kg}$ bw |
| Anthracene | 2625.0 | 1500.0 | 656.2 | Non-cancer EPA RfD ${ }^{2}$; 70 kg bw |
| Pyrenc | 262.5 | 150.0 | 65.6 | Non-cancer EPA RID'; 70kg bw |
| Fluaranthene | 350.0 | 200.0 | 87.5 | Non-cancer EPA RfD ${ }^{2}$; 70kg bw |
| Chrysent | 83.9 | 47.9 | 20.9 | Canoer $0.001 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Beazo(k)faoranthene | 8.4 | 4.8 | 2.1 | Cancer $0.01 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Benzo(b)Amoranthene | 0.84 | 0.48 | 0.21 | Cancer $0.10 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Benr(a)anthravene | 0.84 | 0.48 | 0.21 | Cancer $0.10 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Indo( $1,2,3$-cd)pyreas | 0.84 | 0.48 | 0.21 | Cancer $0.10 \mathrm{~B}(\mathrm{~g}) \mathrm{P}$ equivalent ${ }^{3}$ |
| Dibenz( $2, \mathrm{~h}$ ) mitlracene | 0.084 | 0.048 | 0.021 | Cancer 1.0 B (a)P equivalent ${ }^{3}$ |
| Benzo(a)pyrene | 0.084 | 0.048 | 0.021 | $\begin{gathered} 10^{5} \text { Cancer risk - } \\ (95.9 \mathrm{ge} / \mathrm{p} / \mathrm{d})(70 / 10 \mathrm{yr})^{3} \\ \hline \end{gathered}$ |

Includes alkylated homologues, specifically C-1, C-2, C-3, C-4 napthalenes; C-1, C-2, C-3 fluorenes; C-1, $\mathrm{C}-2, \mathrm{C}-3$ anthracenes; $\mathrm{C}-1, \mathrm{C}-2$ pyrenes. Alkylated homologues assumed to have similar toxicities to the parent compound.
${ }^{2}$ With respect to the Basis:

| Chemical | RID $\times$ Body WL. / Intake |
| :--- | :---: |
| Naphthalene: | $(0.02 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluorene: | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Anthracene: | $(0.30 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Pyrene | $(0.03 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |
| Fluoranthene | $(0.04 \mathrm{mg} / \mathrm{kg} / \mathrm{d} \times 70 \mathrm{~kg}) /$ Daily Intake $(\mathrm{kg})$ |

${ }^{3}$ Cancer risk-( $q^{*}$ )-based criteria:

| Chrysene | [95.9ng x (70/10)]/Daily Intake (g) x 0.001] |
| :---: | :---: |
| Benzo(k)fluoranthene | [95.90g $\times$ (70/10)]/Daily Intake (g) $\times 0.01$ ] |
| Benzo(b)fluoranthene | [95.9ng $\times$ (70/10) V/Daily Intake (g) $\times 0.1$ ] |
| Benz(a)anthracene | $[95.9 \mathrm{ag} \times$ (70/10)]/[Daily Intake (g) x 0.1$]$ |
| Indo(1,2,3-cd)pyrene | [95.9ng x (70/10)]/Daily lntake (g) $\times 0.1]$ |
| Dibenz(a,h)anthracene | [95.9ng x (70/10)]/Daily Intake (8)] |
| Benzo(a)pyrene | [95.9ng x (70/10)]/Daily Intake (g)] |

The States isted additical PAHs for completeness, and indicated that all available TEFs are iecluted but mey not be used depensing on chemical analysis used.

One-in-a-one hundred thousand increase in the lifetime (assumes 70 yr life expectancy) upper bound cancer risk adjusted to account for exposures which are expected to last longer than 10 years ( $70 / 10 \mathrm{yr}$ ). The

[^2]Table I

## Levels of Concern

| Chemical ${ }^{2}$ | Levels of Concern (ppm) |  |  | Basis ${ }^{\text {a }}$ |
| :---: | :---: | :---: | :---: | :---: |
|  | 90 g/day (Shrimp and Crabs) | $\begin{aligned} & 120 \text { g/day } \\ & \text { (Oysters) } \end{aligned}$ | $160 \mathrm{~g} / \mathrm{d} \mathrm{z} y$ (Finfish) |  |
| Naphthslene | 15.55 | 11.66 | 8.75 | $\begin{gathered} \text { Non-canser EPA RfD; } 70 \mathrm{~kg} \\ \text { bw } \end{gathered}$ |
| Fluorene | 31.11 | 23.33 | 17.50 | Non-cusect EPA RfD; 70 kg bw |
| Anthracene/phenanthracene | 233.33 | 175.00 | 131.25 | $\begin{aligned} & \text { Non-tarcer EPA RfD; } 70 \mathrm{~kg} \\ & \text { bw } \end{aligned}$ |
| Fluoranthene | 3.10 | 2.33 | 1.75 | Cancer $0.02 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalency |
| Pyrene | 0.48 | 0.36 | 0.27 | Cancer $0.13 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalecey |
| Benz(a)anthrncene | 4.30 | 3.29 | 2.54 | Cancer $0.014 \mathrm{~B}(\mathrm{a}) \mathrm{P}$ equivalercy |
| Chrysene | 4.65 | 3.49 | 2.66 | Cencer 0.013 B(a)P equivalency |
| Benzo(a)pyrese | 0.06 | 0.05 | 0.03 | $10^{-3}$ Cancer risk $=$ ( $399 \mathrm{gg} / \mathrm{pld}$ ) $(7015 \mathrm{yz})^{3}$ |


| RID tasted criteris: | R(1) |
| :---: | :---: |
| Napththalens: | (0.02 mp/kpldx $70 \mathrm{~kg} / \mathrm{D}$ Dily Intaike (kg) |
| Fiucrene: | (0.04 mgedg ${ }^{\text {d }}$ ( 70 kg / Daily latake (kg) |
| Anthractac: | (0.30 mp/kpl $\times$ 7 $7 \mathrm{~kg} / \mathrm{l}$ Daily litake (kg) |

Alkylated homstoguss rssumed to have similar toxicities to the parent compound. Anthrseene and pheranthrazene were combined because routiat chemical analysis does not distinguish between the amalogues of these tro compounds.

| Cancer risk-( $0^{*}$ ) | criterisi ${ }^{\text {a }}$ |
| :---: | :---: |
| Flucranthene: | [399ng $\times$ (70/5) Y) [Daily Intake ( p ) $\times 0.02]$ |
| Pyrene: | [399ng x (70/5) Y[Daily Intake (e) $\times$ 0.13] |
| Bens(a)arthrweene: | [399ng x (70/5) Y [Daily Intake (8) $\times 0.014]$ |
| Chrysume: | [399ngx (70/5) \| [Deily Intake (g) x 0.013] |
| Benao(s)pytene: | [399ng $\times$ (70VS)y]Daily lntake (el] |

One-in-2h-hendred thousand increase in the lifetime upper bound concer risk sdjusted to ascount for exporures which are expocted to last bonger than 5 years ( $70 / 5$ yof). For any sample containing fleoranthene, pyrene, benz(a)anthrecene, chrysene, or benzo(a)pyzene, the sum of the individual retios of the detectod levels to the levels of conoem cannot exceed 1


[^0]:    **FDA documents provided to NRDC in response to a Freedom of Information Act (FOIA) request**
    Part C: Tables of values considered in FDA risk assessment

[^1]:    **FDA documents provided to NRDC in response to a Freedom of Information Act (FOIA) request**
    Part C: Tables of values considered in FDA risk assessment

[^2]:    **FDA documents provided to NRDC in response to a Freedom of Information Act (FOIA) request**
    Part C: Tables of values considered in FDA risk assessment

